

SEQUENCE LISTING

<110> TURECI, Ozlem
SAHIN, Ugar
KREITER, Sebastian

<120> Recombinant Vaccines and Use Thereof

<130> VOS-120

<140> US 10/575,640
<141> 2006-04-13

<150> PCT/EP2004/011512
<151> 2004-10-13

<150> DE 103 47 710.1
<151> 2003-10-14

<160> 66

<170> PatentIn version 3.1

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<211> 78
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<213> Homo sapiens

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<212> PRT
<213> Homo sapiens

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Leu Ala Leu Thr Glu Thr Trp Ala Gly Ser
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<212> DNA
<213> Homo sapiens

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Lys Gly Gly Ser Tyr Ser Gln Ala Ala Ser Ser Asp Ser Ala Gln Gly
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Ser Asp Val Ser Leu Thr Ala
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<212> DNA
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<211> 42
<212> PRT
<213> Homo sapiens

<400> 6

Gln Ser Lys Met Leu Ser Gly Val Gly Gly Phe Val Leu Gly Leu Leu
1 5 10 15

Phe Leu Gly Ala Gly Leu Phe Ile Tyr Phe Arg Asn Gln Lys Gly His
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Ser Gly Leu Gln Pro Arg Gly Phe Leu Ser
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<212> DNA

<213> Artificial Sequence
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 <223> DNA of restriction site in human HLA class I domains
 <400> 7
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<210> 8
 <211> 8
 <212> PRT
 <213> Artificial Sequence
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 <223> Restriction site in human HLA class I domains
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<210> 9
 <211> 1683
 <212> DNA
 <213> Human cytomegalovirus

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Pro Val Leu Pro His Glu Thr Arg Leu Leu Gln Thr Gly Ile His Val
 35 40 45

Arg Val Ser Gln Pro Ser Leu Ile Leu Val Ser Gln Tyr Thr Pro Asp
 50 55 60

Ser Thr Pro Cys His Arg Gly Asp Asn Gln Leu Gln Val Gln His Thr
 65 70 75 80

Tyr Phe Thr Gly Ser Glu Val Glu Asn Val Ser Val Asn Val His Asn
 85 90 95

Pro Thr Gly Arg Ser Ile Cys Pro Ser Gln Glu Pro Met Ser Ile Tyr

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105

110

Val Tyr Ala Leu Pro Leu Lys Met Leu Asn Ile Pro Ser Ile Asn Val
115 120 125

His His Tyr Pro Ser Ala Ala Glu Arg Lys His Arg His Leu Pro Val
130 135 140

Ala Asp Ala Val Ile His Ala Ser Gly Lys Gln Met Trp Gln Ala Arg
145 150 155 160

Leu Thr Val Ser Gly Leu Ala Trp Thr Arg Gln Gln Asn Gln Trp Lys
165 170 175

Glu Pro Asp Val Tyr Tyr Ser Ala Phe Val Phe Pro Thr Lys Asp
180 185 190

Val Ala Leu Arg His Val Val Cys Ala His Glu Leu Val Cys Ser Met
195 200 205

Glu Asn Thr Arg Ala Thr Lys Met Gln Val Ile Gly Asp Gln Tyr Val
210 215 220

Lys Val Tyr Leu Glu Ser Phe Cys Glu Asp Val Pro Ser Gly Lys Leu
225 230 235 240

Phe Met His Val Thr Leu Gly Ser Asp Val Glu Glu Asp Leu Thr Met
245 250 255

Thr Arg Asn Pro Gln Pro Phe Met Arg Pro His Glu Arg Asn Gly Phe
260 265 270

Thr Val Leu Cys Pro Lys Asn Met Ile Ile Lys Pro Gly Lys Ile Ser
275 280 285

His Ile Met Leu Asp Val Ala Phe Thr Ser His Glu His Phe Gly Leu
290 295 300

Leu Cys Pro Lys Ser Ile Pro Gly Leu Ser Ile Ser Gly Asn Leu Leu
305 310 315 320

Met Asn Gly Gln Gln Ile Phe Leu Glu Val Gln Ala Ile Arg Glu Thr
325 330 335

Val Glu Leu Arg Gln Tyr Asp Pro Val Ala Ala Leu Phe Phe Asp

340

345

350

Ile Asp Leu Leu Leu Gln Arg Gly Pro Gln Tyr Ser Glu His Pro Thr
355 360 365

Phe Thr Ser Gln Tyr Arg Ile Gln Gly Lys Leu Glu Tyr Arg His Thr
370 375 380

Trp Asp Arg His Asp Glu Gly Ala Ala Gln Gly Asp Asp Asp Val Trp
385 390 395 400

Thr Ser Gly Ser Asp Ser Asp Glu Glu Leu Val Thr Thr Glu Arg Lys
405 410 415

Thr Pro Arg Val Thr Gly Gly Ala Met Ala Gly Ala Ser Thr Ser
420 425 430

Ala Gly Arg Lys Arg Lys Ser Ala Ser Ser Ala Thr Ala Cys Thr Ser
435 440 445

Gly Val Met Thr Arg Gly Arg Leu Lys Ala Glu Ser Thr Val Ala Pro
450 455 460

Glu Glu Asp Thr Asp Glu Asp Ser Asp Asn Glu Ile His Asn Pro Ala
465 470 475 480

Val Phe Thr Trp Pro Pro Trp Gln Ala Gly Ile Leu Ala Arg Asn Leu
485 490 495

Val Pro Met Val Ala Thr Val Gln Gly Gln Asn Leu Lys Tyr Gln Glu
500 505 510

Phe Phe Trp Asp Ala Asn Asp Ile Tyr Arg Ile Phe Ala Glu Leu Glu
515 520 525

Gly Val Trp Gln Pro Ala Ala Gln Pro Lys Arg Arg Arg His Arg Gln
530 535 540

Asp Ala Leu Pro Gly Pro Cys Ile Ala Ser Thr Pro Lys Lys His Arg
545 550 555 560

Gly

<211> 1962
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> DNA encoding human HLA class I domains and CMV pp65

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 atccacgtac gcgtgagcca gcctcgctg atcttggtat cgcagtacac gcccgactcg 300
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<210> 12
<211> 653
<212> PRT
<213> Artificial Sequence

<220>
<223> Fusion protein of human HLA class I domains and CMV pp65

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Gly Ser Thr Met Glu Ser Arg Gly Arg Arg Cys Pro Glu Met Ile Ser
35 40 45

Val Leu Gly Pro Ile Ser Gly His Val Leu Lys Ala Val Phe Ser Arg
50 55 60

Gly Asp Thr Pro Val Leu Pro His Glu Thr Arg Leu Leu Gln Thr Gly
65 70 75 80

Ile His Val Arg Val Ser Gln Pro Ser Leu Ile Leu Val Ser Gln Tyr
85 90 95

Thr Pro Asp Ser Thr Pro Cys His Arg Gly Asp Asn Gln Leu Gln Val
100 105 110

Gln His Thr Tyr Phe Thr Gly Ser Glu Val Glu Asn Val Ser Val Asn
115 120 125

Val His Asn Pro Thr Gly Arg Ser Ile Cys Pro Ser Gln Glu Pro Met
130 135 140

Ser Ile Tyr Val Tyr Ala Leu Pro Leu Lys Met Leu Asn Ile Pro Ser
145 150 155 160

Ile Asn Val His His Tyr Pro Ser Ala Ala Glu Arg Lys His Arg His
165 170 175

Leu Pro Val Ala Asp Ala Val Ile His Ala Ser Gly Lys Gln Met Trp
180 185 190

Gln Ala Arg Leu Thr Val Ser Gly Leu Ala Trp Thr Arg Gln Gln Asn
195 200 205

Gln Trp Lys Glu Pro Asp Val Tyr Tyr Thr Ser Ala Phe Val Phe Pro
210 215 220

Thr Lys Asp Val Ala Leu Arg His Val Val Cys Ala His Glu Leu Val
225 230 235 240

Cys Ser Met Glu Asn Thr Arg Ala Thr Lys Met Gln Val Ile Gly Asp
245 250 255

Gln Tyr Val Lys Val Tyr Leu Glu Ser Phe Cys Glu Asp Val Pro Ser
260 265 270

Gly Lys Leu Phe Met His Val Thr Leu Gly Ser Asp Val Glu Glu Asp
275 280 285

Leu Thr Met Thr Arg Asn Pro Gln Pro Phe Met Arg Pro His Glu Arg
290 295 300

Asn Gly Phe Thr Val Leu Cys Pro Lys Asn Met Ile Ile Lys Pro Gly
305 310 315 320

Lys Ile Ser His Ile Met Leu Asp Val Ala Phe Thr Ser His Glu His
325 330 335

Phe Gly Leu Leu Cys Pro Lys Ser Ile Pro Gly Leu Ser Ile Ser Gly
340 345 350

Asn Leu Leu Met Asn Gly Gln Gln Ile Phe Leu Glu Val Gln Ala Ile
355 360 365

Arg Glu Thr Val Glu Leu Arg Gln Tyr Asp Pro Val Ala Ala Leu Phe
370 375 380

Phe Phe Asp Ile Asp Leu Leu Leu Gln Arg Gly Pro Gln Tyr Ser Glu
385 390 395 400

His Pro Thr Phe Thr Ser Gln Tyr Arg Ile Gln Gly Lys Leu Glu Tyr
405 410 415

Arg His Thr Trp Asp Arg His Asp Glu Gly Ala Ala Gln Gly Asp Asp
420 425 430

Asp Val Trp Thr Ser Gly Ser Asp Ser Asp Glu Glu Leu Val Thr Thr
435 440 445

Glu Arg Lys Thr Pro Arg Val Thr Gly Gly Ala Met Ala Gly Ala
450 455 460

Ser Thr Ser Ala Gly Arg Lys Arg Lys Ser Ala Ser Ser Ala Thr Ala
465 470 475 480

Cys Thr Ser Gly Val Met Thr Arg Gly Arg Leu Lys Ala Glu Ser Thr
485 490 495

Val Ala Pro Glu Glu Asp Thr Asp Glu Asp Ser Asp Asn Glu Ile His
500 505 510

Asn Pro Ala Val Phe Thr Trp Pro Pro Trp Gln Ala Gly Ile Leu Ala
515 520 525

Arg Asn Leu Val Pro Met Val Ala Thr Val Gln Gly Gln Asn Leu Lys
530 535 540

Tyr Gln Glu Phe Phe Trp Asp Ala Asn Asp Ile Tyr Arg Ile Phe Ala
545 550 555 560

Glu Leu Glu Gly Val Trp Gln Pro Ala Ala Gln Pro Lys Arg Arg Arg
565 570 575

His Arg Gln Asp Ala Leu Pro Gly Pro Cys Ile Ala Ser Thr Pro Lys
580 585 590

Lys His Arg Gly Gly Ser Ile Val Gly Ile Val Ala Gly Leu Ala Val
595 600 605

Leu Ala Val Val Val Ile Gly Ala Val Val Ala Thr Val Met Cys Arg
610 615 620

Arg Lys Ser Ser Gly Gly Lys Gly Ser Tyr Ser Gln Ala Ala Ser
625 630 635 640

Ser Asp Ser Ala Gln Gly Ser Asp Val Ser Leu Thr Ala
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<210> 13
<211> 1923
<212> DNA
<213> Artificial Sequence

<220>

<223> DNA encoding human HLA class I/II domains and CMV pp65

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tga 1923

<210> 14
<211> 640
<212> PRT
<213> Artificial Sequence

<220>
<223> Human HLA class I/II domains and CMV pp65 fusion protein

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20 25 30

Gly Ser Thr Met Glu Ser Arg Gly Arg Arg Cys Pro Glu Met Ile Ser
35 40 45

Val Leu Gly Pro Ile Ser Gly His Val Leu Lys Ala Val Phe Ser Arg
50 55 60

Gly Asp Thr Pro Val Leu Pro His Glu Thr Arg Leu Leu Gln Thr Gly
65 70 75 80

Ile His Val Arg Val Ser Gln Pro Ser Leu Ile Leu Val Ser Gln Tyr
85 90 95

Thr Pro Asp Ser Thr Pro Cys His Arg Gly Asp Asn Gln Leu Gln Val

100

105

110

Gln His Thr Tyr Phe Thr Gly Ser Glu Val Glu Asn Val Ser Val Asn
115 120 125

Val His Asn Pro Thr Gly Arg Ser Ile Cys Pro Ser Gln Glu Pro Met
130 135 140

Ser Ile Tyr Val Tyr Ala Leu Pro Leu Lys Met Leu Asn Ile Pro Ser
145 150 155 160

Ile Asn Val His His Tyr Pro Ser Ala Ala Glu Arg Lys His Arg His
165 170 175

Leu Pro Val Ala Asp Ala Val Ile His Ala Ser Gly Lys Gln Met Trp
180 185 190

Gln Ala Arg Leu Thr Val Ser Gly Leu Ala Trp Thr Arg Gln Gln Asn
195 200 205

Gln Trp Lys Glu Pro Asp Val Tyr Tyr Thr Ser Ala Phe Val Phe Pro
210 215 220

Thr Lys Asp Val Ala Leu Arg His Val Val Cys Ala His Glu Leu Val
225 230 235 240

Cys Ser Met Glu Asn Thr Arg Ala Thr Lys Met Gln Val Ile Gly Asp
245 250 255

Gln Tyr Val Lys Val Tyr Leu Glu Ser Phe Cys Glu Asp Val Pro Ser
260 265 270

Gly Lys Leu Phe Met His Val Thr Leu Gly Ser Asp Val Glu Glu Asp
275 280 285

Leu Thr Met Thr Arg Asn Pro Gln Pro Phe Met Arg Pro His Glu Arg
290 295 300

Asn Gly Phe Thr Val Leu Cys Pro Lys Asn Met Ile Ile Lys Pro Gly
305 310 315 320

Lys Ile Ser His Ile Met Leu Asp Val Ala Phe Thr Ser His Glu His
325 330 335

Phe Gly Leu Leu Cys Pro Lys Ser Ile Pro Gly Leu Ser Ile Ser Gly

340

345

350

Asn Leu Leu Met Asn Gly Gln Gln Ile Phe Leu Glu Val Gln Ala Ile
355 360 365

Arg Glu Thr Val Glu Leu Arg Gln Tyr Asp Pro Val Ala Ala Leu Phe
370 375 380

Phe Phe Asp Ile Asp Leu Leu Leu Gln Arg Gly Pro Gln Tyr Ser Glu
385 390 395 400

His Pro Thr Phe Thr Ser Gln Tyr Arg Ile Gln Gly Lys Leu Glu Tyr
405 410 415

Arg His Thr Trp Asp Arg His Asp Glu Gly Ala Ala Gln Gly Asp Asp
420 425 430

Asp Val Trp Thr Ser Gly Ser Asp Ser Asp Glu Glu Leu Val Thr Thr
435 440 445

Glu Arg Lys Thr Pro Arg Val Thr Gly Gly Gly Ala Met Ala Gly Ala
450 455 460

Ser Thr Ser Ala Gly Arg Lys Arg Ser Ala Ser Ser Ala Thr Ala
465 470 475 480

Cys Thr Ser Gly Val Met Thr Arg Gly Arg Leu Lys Ala Glu Ser Thr
485 490 495

Val Ala Pro Glu Glu Asp Thr Asp Glu Asp Ser Asp Asn Glu Ile His
500 505 510

Asn Pro Ala Val Phe Thr Trp Pro Pro Trp Gln Ala Gly Ile Leu Ala
515 520 525

Arg Asn Leu Val Pro Met Val Ala Thr Val Gln Gly Gln Asn Leu Lys
530 535 540

Tyr Gln Glu Phe Phe Trp Asp Ala Asn Asp Ile Tyr Arg Ile Phe Ala
545 550 555 560

Glu Leu Glu Gly Val Trp Gln Pro Ala Ala Gln Pro Lys Arg Arg Arg
565 570 575

His Arg Gln Asp Ala Leu Pro Gly Pro Cys Ile Ala Ser Thr Pro Lys
Page 14

580

585

590

Lys His Arg Gly Gly Ser Gln Ser Lys Met Leu Ser Gly Val Gly Gly
595 600 605

Phe Val Leu Gly Leu Leu Phe Leu Gly Ala Gly Leu Phe Ile Tyr Phe
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Arg Asn Gln Lys Gly His Ser Gly Leu Gln Pro Arg Gly Phe Leu Ser
625 630 635 640

<210> 15
<211> 66
<212> PRT
<213> Homo sapiens

<400> 15

Pro Ser Ser Gln Pro Thr Ile Pro Ile Val Gly Ile Ile Ala Gly Leu
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Val Leu Phe Gly Ala Val Ile Thr Gly Ala Val Val Ala Ala Val Met
20 25 30

Trp Arg Arg Lys Ser Ser Asp Arg Lys Gly Gly Ser Tyr Ser Gln Ala
35 40 45

Ala Ser Ser Asp Ser Ala Gln Gly Ser Asp Val Ser Leu Thr Ala Cys
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Lys Val
65

<210> 16
<211> 24
<212> PRT
<213> Homo sapiens

<400> 16

Gly Ser Tyr Ser Gln Ala Ala Ser Ser Asp Ser Ala Gln Gly Ser Asp
1 5 10 15

Val Ser Leu Thr Ala Cys Lys Val
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<210> 17
<211> 63
<212> PRT

<213> Homo sapiens

<400> 17

Pro Ser Ser Gln Ser Thr Val Pro Ile Val Gly Ile Val Ala Gly Leu
1 5 10 15

Ala Val Leu Ala Val Val Val Ile Gly Ala Val Val Ala Ala Val Met
20 25 30

Cys Arg Arg Lys Ser Ser Gly Gly Lys Gly Gly Ser Tyr Ser Gln Ala
35 40 45

Ala Cys Ser Asp Ser Ala Gln Gly Ser Asp Val Ser Leu Thr Ala
50 55 60

<210> 18

<211> 21

<212> PRT

<213> Homo sapiens

<400> 18

Gly Ser Tyr Ser Gln Ala Ala Cys Ser Asp Ser Ala Gln Gly Ser Asp
1 5 10 15

Val Ser Leu Thr Ala
20

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<211> 67

<212> PRT

<213> Homo sapiens

<400> 19

Pro Ser Ser Gln Pro Thr Ile Pro Ile Val Gly Ile Val Ala Gly Leu
1 5 10 15

Ala Val Leu Ala Val Leu Ala Val Leu Gly Ala Met Val Ala Val Val
20 25 30

Met Cys Arg Arg Lys Ser Ser Gly Gly Lys Gly Gly Ser Cys Ser Gln
35 40 45

Ala Ala Ser Ser Asn Ser Ala Gln Gly Ser Asp Glu Ser Leu Ile Ala
50 55 60

Cys Lys Ala
65

<210> 20
<211> 14
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<400> 20

Ser Ala Gln Gly Ser Asp Glu Ser Leu Ile Ala Cys Lys Ala
1 5 10

<210> 21
<211> 62
<212> PRT
<213> Homo sapiens

<400> 21

Pro Ala Ser Gln Pro Thr Ile Pro Ile Val Gly Ile Ile Ala Gly Leu
1 5 10 15

Val Leu Leu Gly Ser Val Val Ser Gly Ala Val Val Ala Ala Val Ile
20 25 30

Trp Arg Lys Lys Ser Ser Gly Gly Lys Gly Ser Tyr Ser Lys Ala
35 40 45

Glu Trp Ser Asp Ser Ala Gln Gly Ser Glu Ser His Ser Leu
50 55 60

<210> 22
<211> 20
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<213> Homo sapiens

<400> 22

Gly Ser Tyr Ser Lys Ala Glu Trp Ser Asp Ser Ala Gln Gly Ser Glu
1 5 10 15

Ser His Ser Leu
20

<210> 23
<211> 66
<212> PRT
<213> Homo sapiens

<400> 23

Gln Ser Pro Gln Pro Thr Ile Pro Ile Val Gly Ile Val Ala Gly Leu
1 5 10 15

Val Val Leu Gly Ala Val Val Thr Gly Ala Val Val Ala Ala Val Met
20 25 30

Trp Arg Lys Lys Ser Ser Asp Arg Asn Arg Gly Ser Tyr Ser Gln Ala
35 40 45

Ala Val Thr Asp Ser Ala Gln Gly Ser Gly Val Ser Leu Thr Ala Asn
50 55 60

Lys Val
65

<210> 24
<211> 27
<212> PRT
<213> Homo sapiens

<400> 24

Arg Asn Arg Gly Ser Tyr Ser Gln Ala Ala Val Thr Asp Ser Ala Gln
1 5 10 15

Gly Ser Gly Val Ser Leu Thr Ala Asn Lys Val
20 25

<210> 25
<211> 37
<212> PRT
<213> Homo sapiens

<400> 25

Val Val Cys Ala Leu Gly Leu Thr Val Gly Leu Val Gly Ile Ile Ile
1 5 10 15

Gly Thr Ile Phe Ile Ile Lys Gly Leu Arg Lys Ser Asn Ala Ala Glu
20 25 30

Arg Arg Gly Pro Leu
35

<210> 26
<211> 12
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<213> Homo sapiens

<400> 26

Arg Lys Ser Asn Ala Ala Glu Arg Arg Gly Pro Leu

1 5 10

<210> 27
<211> 38
<212> PRT
<213> Homo sapiens

<400> 27

Met Leu Ser Gly Val Gly Gly Phe Val Leu Gly Leu Leu Phe Leu Ala
1 5 10 15

Gly Leu Phe Ile Tyr Phe Arg Asn Gln Lys Gly His Ser Gly Leu Gln
20 25 30

Pro Arg Gly Phe Leu Ser
35

<210> 28
<211> 12
<212> PRT
<213> Homo sapiens

<400> 28

Gly His Ser Gly Leu Gln Pro Arg Gly Phe Leu Ser
1 5 10

<210> 29
<211> 37
<212> PRT
<213> Homo sapiens

<400> 29

Val Val Cys Ala Leu Gly Leu Ser Val Gly Leu Met Gly Ile Val Val
1 5 10 15

Gly Thr Val Phe Ile Ile Gln Gly Leu Arg Ser Val Gly Ala Ser Arg
20 25 30

His Gln Gly Pro Leu
35

<210> 30
<211> 10
<212> PRT
<213> Homo sapiens

<400> 30

Val Gly Ala Ser Arg His Gln Gly Pro Leu

1

5

10

<210> 31
<211> 31
<212> PRT
<213> Homo sapiens

<400> 31

Met Leu Ser Gly Ile Gly Gly Phe Val Leu Gly Leu Ile Phe Leu Gly
1 5 10 15

Leu Gly Leu Ile Ile His His Arg Ser Gln Lys Gly Leu Leu His
20 25 30

<210> 32
<211> 8
<212> PRT
<213> Homo sapiens

<400> 32

Arg Ser Gln Lys Gly Leu Leu His
1 5

<210> 33
<211> 37
<212> PRT
<213> Homo sapiens

<400> 33

Val Leu Cys Ala Leu Gly Leu Val Leu Gly Leu Val Gly Ile Ile Val
1 5 10 15

Gly Thr Val Leu Ile Ile Lys Ser Leu Arg Ser Gly His Asp Pro Arg
20 25 30

Ala Gln Gly Thr Leu
35

<210> 34
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<212> PRT
<213> Homo sapiens

<400> 34

Arg Ser Gly His Asp Pro Arg Ala Gln Gly Thr Leu
1 5 10

<210> 35

<211> 33
<212> PRT
<213> Homo sapiens

<400> 35

Thr Leu Thr Gly Ala Gly Gly Phe Val Leu Gly Leu Ile Ile Cys Gly
1 5 10 15

Val Gly Ile Phe Met His Arg Arg Ser Lys Lys Val Gln Arg Gly Ser
20 25 30

Ala

<210> 36
<211> 9
<212> PRT
<213> Homo sapiens

<400> 36

Ser Lys Lys Val Gln Arg Gly Ser Ala
1 5

<210> 37
<211> 26
<212> PRT
<213> Homo sapiens

<400> 37

Phe Ile Ile Leu Ala Val Ile Val Pro Leu Leu Leu Leu Ile Gly Leu
1 5 10 15

Ala Leu Trp Phe Arg Lys Arg Cys Phe Cys
20 25

<210> 38
<211> 6
<212> PRT
<213> Homo sapiens

<400> 38

Arg Lys Arg Cys Phe Cys
1 5

<210> 39
<211> 30
<212> PRT
<213> Homo sapiens

<400> 39

Ile Val Leu Ala Ile Ile Val Pro Ser Leu Leu Leu Leu Cys Leu
1 5 10 15

Ala Leu Trp Tyr Met Arg Arg Arg Ser Tyr Gln Asn Ile Pro
20 25 30

<210> 40

<211> 9

<212> PRT

<213> Homo sapiens

<400> 40

Arg Arg Arg Ser Tyr Gln Asn Ile Pro
1 5

<210> 41

<211> 30

<212> PRT

<213> Homo sapiens

<400> 41

Trp Ile Ala Leu Val Val Ile Val Pro Leu Val Ile Leu Ile Val Leu
1 5 10 15

Val Leu Trp Phe Lys Lys His Cys Ser Tyr Gln Asp Ile Leu
20 25 30

<210> 42

<211> 10

<212> PRT

<213> Homo sapiens

<400> 42

Lys Lys His Cys Ser Tyr Gln Asp Ile Leu
1 5 10

<210> 43

<211> 250

<212> PRT

<213> Homo sapiens

<400> 43

Met Ala Ala Gly Thr Ser Ser Tyr Trp Glu Asp Leu Arg Lys Gln Ala
1 5 10 15

Arg Gln Leu Glu Asn Glu Leu Asp Leu Lys Leu Val Ser Phe Ser Lys
20 25 30

Leu Cys Thr Ser Tyr Ser His Ser Ser Thr Arg Asp Gly Arg Arg Asp
35 40 45

Arg Tyr Ser Ser Asp Thr Thr Pro Leu Leu Asn Gly Ser Ser Gln Asp
50 55 60

Arg Met Phe Glu Thr Met Ala Ile Glu Ile Glu Gln Leu Leu Ala Arg
65 70 75 80

Leu Thr Gly Val Asn Asp Lys Met Ala Glu Tyr Thr Asn Ser Ala Gly
85 90 95

Val Pro Ser Leu Asn Ala Ala Leu Met His Thr Leu Gln Arg His Arg
100 105 110

Asp Ile Leu Gln Asp Tyr Thr His Glu Phe His Lys Thr Lys Ala Asn
115 120 125

Phe Met Ala Ile Arg Glu Arg Glu Asn Leu Met Gly Ser Val Arg Lys
130 135 140

Asp Ile Glu Ser Tyr Lys Ser Gly Ser Gly Val Asn Asn Arg Arg Thr
145 150 155 160

Glu Leu Phe Leu Lys Glu His Asp His Leu Arg Asn Ser Asp Arg Leu
165 170 175

Ile Glu Glu Thr Ile Ser Ile Ala Met Ala Thr Lys Glu Asn Met Thr
180 185 190

Ser Gln Arg Gly Met Leu Lys Ser Ile His Ser Lys Met Asn Thr Leu
195 200 205

Ala Asn Arg Phe Pro Ala Val Asn Ser Leu Ile Gln Arg Ile Asn Leu
210 215 220

Arg Lys Arg Arg Asp Ser Leu Ile Leu Gly Gly Val Ile Gly Ile Cys
225 230 235 240

Thr Ile Leu Leu Leu Tyr Ala Phe His
245 250

<210> 44
<211> 128

<212> PRT
<213> Homo sapiens

<400> 44

Met Gly Ala Ser Leu Thr Ser Pro Gly Thr Gln Glu Lys Leu Ile Arg
1 5 10 15

Asp Phe Asp Glu Lys Gln Gln Glu Ala Asn Lys Met Leu Thr Gln Met
20 25 30

Glu Glu Glu Leu His Tyr Ala Pro Val Ser Phe His Asn Pro Met Met
35 40 45

Ser Lys Leu Gln Asp Tyr Gln Lys Asp Leu Ala Gln Phe His Leu Glu
50 55 60

Ala Arg Thr Met Pro Gly Asp Arg Gly Asp Met Lys Tyr Gly Thr Tyr
65 70 75 80

Ala Val Glu Asn Glu His Met Asn Arg Leu Gln Ser Gln Arg Ala Met
85 90 95

Leu Leu Gln Gly Thr Lys Ser Leu Gly Arg Ala Thr Gln Glu Thr Asp
100 105 110

Gln Ile Gly Ser Glu Ile Ser Glu Glu Leu Gly Asn Gln Arg Asp Gln
115 120 125

<210> 45
<211> 212
<212> PRT
<213> Homo sapiens

<400> 45

Met Asp Pro Leu Phe Gln Gln Thr His Lys Gln Val His Glu Ile Gln
1 5 10 15

Ser Cys Met Gly Arg Leu Glu Thr Ala Asp Lys Gln Ser Val His Ile
20 25 30

Val Glu Asn Glu Ile Gln Ala Ser Ile Asp Gln Ile Phe Ser Arg Leu
35 40 45

Glu Arg Leu Glu Ile Leu Ser Ser Lys Glu Pro Pro Asn Lys Arg Gln
50 55 60

Asn Ala Arg Leu Arg Val Asp Gln Leu Lys Tyr Asp Val Gln His Leu
65 70 75 80

Gln Thr Ala Leu Arg Asn Phe Gln His Arg Arg His Ala Arg Glu Gln
85 90 95

Gln Glu Arg Gln Arg Glu Glu Leu Leu Ser Arg Thr Phe Thr Thr Asn
100 105 110

Asp Ser Asp Thr Thr Ile Pro Met Asp Glu Ser Leu Gln Phe Asn Ser
115 120 125

Ser Leu Gln Lys Val His Asn Gly Met Asp Asp Leu Ile Leu Asp Gly
130 135 140

His Asn Ile Leu Asp Gly Leu Arg Thr Gln Arg Leu Thr Leu Lys Gly
145 150 155 160

Thr Gln Lys Lys Ile Leu Asp Ile Ala Asn Met Leu Gly Leu Ser Asn
165 170 175

Thr Val Met Arg Leu Ile Glu Lys Arg Ala Phe Gln Asp Lys Tyr Phe
180 185 190

Met Ile Gly Gly Met Leu Leu Thr Cys Val Val Met Phe Leu Val Val
195 200 205

Gln Tyr Leu Thr
210

<210> 46
<211> 172
<212> PRT
<213> Homo sapiens

<400> 46

Met Ser Val Pro Gly Pro Ser Ser Pro Asp Gly Ala Leu Thr Arg Pro
1 5 10 15

Pro Tyr Cys Leu Glu Ala Gly Glu Pro Thr Pro Gly Leu Ser Asp Thr
20 25 30

Ser Pro Asp Glu Gly Leu Ile Glu Asp Leu Thr Ile Glu Asp Lys Ala
35 40 45

Val Glu Gln Leu Ala Glu Gly Leu Leu Ser His Tyr Leu Pro Asp Leu

50

55

60

Gln Arg Ser Lys Gln Ala Leu Gln Glu Leu Thr Gln Asn Gln Val Val
65 70 75 80

Leu Leu Asp Thr Leu Glu Gln Glu Ile Ser Lys Phe Lys Glu Cys His
85 90 95

Ser Met Leu Asp Ile Asn Ala Leu Phe Ala Glu Ala Lys His Tyr His
100 105 110

Ala Lys Leu Val Asn Ile Arg Lys Glu Met Leu Met Leu His Glu Lys
115 120 125

Thr Ser Lys Leu Lys Lys Arg Ala Leu Lys Leu Gln Gln Lys Arg Gln
130 135 140

Lys Glu Glu Leu Glu Arg Glu Gln Gln Arg Glu Lys Glu Phe Glu Arg
145 150 155 160

Glu Lys Gln Leu Thr Ala Arg Pro Ala Lys Arg Met
165 170

<210> 47
<211> 301
<212> PRT
<213> Homo sapiens

<400> 47

Met Ser Cys Arg Asp Arg Thr Gln Glu Phe Leu Ser Ala Cys Lys Ser
1 5 10 15

Leu Gln Thr Arg Gln Asn Gly Ile Gln Thr Asn Lys Pro Ala Leu Arg
20 25 30

Ala Val Arg Gln Arg Ser Glu Phe Thr Leu Met Ala Lys Arg Ile Gly
35 40 45

Lys Asp Leu Ser Asn Thr Phe Ala Lys Leu Glu Lys Leu Thr Ile Leu
50 55 60

Ala Lys Arg Lys Ser Leu Phe Asp Asp Lys Ala Val Glu Ile Glu Glu
65 70 75 80

Leu Thr Tyr Ile Ile Lys Gln Asp Ile Asn Ser Leu Asn Lys Gln Ile
85 90 95

Ala Gln Leu Gln Asp Phe Val Arg Ala Lys Gly Ser Gln Ser Gly Arg
100 105 110

His Leu Gln Thr His Ser Asn Thr Ile Val Val Ser Leu Gln Ser Lys
115 120 125

Leu Ala Ser Met Ser Asn Asp Phe Lys Ser Val Leu Glu Val Arg Thr
130 135 140

Glu Asn Leu Lys Gln Gln Arg Ser Arg Arg Glu Gln Phe Ser Arg Ala
145 150 155 160

Pro Val Ser Ala Leu Pro Leu Ala Pro Asn His Leu Gly Gly Ala
165 170 175

Val Val Leu Gly Ala Glu Ser His Ala Ser Lys Asp Val Ala Ile Asp
180 185 190

Met Met Asp Ser Arg Thr Ser Gln Gln Leu Gln Leu Ile Asp Glu Gln
195 200 205

Asp Ser Tyr Ile Gln Ser Arg Ala Asp Thr Met Gln Asn Ile Glu Ser
210 215 220

Thr Ile Val Glu Leu Gly Ser Ile Phe Gln Gln Leu Ala His Met Val
225 230 235 240

Lys Glu Gln Glu Glu Thr Ile Gln Arg Ile Asp Glu Asn Val Leu Gly
245 250 255

Ala Gln Leu Asp Val Glu Ala Ala His Ser Glu Ile Leu Lys Tyr Phe
260 265 270

Gln Ser Val Thr Ser Asn Arg Trp Leu Met Val Lys Ile Phe Leu Ile
275 280 285

Leu Ile Val Phe Phe Ile Ile Phe Val Val Phe Leu Ala
290 295 300

<210> 48
<211> 255
<212> PRT
<213> Homo sapiens

<400> 48

Met Ser Met Glu Asp Pro Phe Phe Val Val Lys Gly Glu Val Gln Lys
1 5 10 15

Ala Val Asn Thr Ala Gln Gly Leu Phe Gln Arg Trp Thr Glu Leu Leu
20 25 30

Gln Asp Pro Ser Thr Ala Thr Arg Glu Glu Ile Asp Trp Thr Thr Asn
35 40 45

Glu Leu Arg Asn Asn Leu Arg Ser Ile Glu Trp Asp Leu Glu Asp Leu
50 55 60

Asp Glu Thr Ile Ser Ile Val Glu Ala Asn Pro Arg Lys Phe Asn Leu
65 70 75 80

Asp Ala Thr Glu Leu Ser Ile Arg Lys Ala Phe Ile Thr Ser Thr Arg
85 90 95

Gln Val Val Arg Asp Met Lys Asp Gln Met Ser Thr Ser Ser Val Gln
100 105 110

Ala Leu Ala Glu Arg Lys Asn Arg Gln Ala Leu Leu Gly Asp Ser Gly
115 120 125

Ser Gln Asn Trp Ser Thr Gly Thr Thr Asp Lys Tyr Gly Arg Leu Asp
130 135 140

Arg Glu Leu Gln Arg Ala Asn Ser His Phe Ile Glu Glu Gln Gln Ala
145 150 155 160

Gln Gln Gln Leu Ile Val Glu Gln Gln Asp Glu Gln Leu Glu Leu Val
165 170 175

Ser Gly Ser Ile Gly Val Leu Lys Asn Met Ser Gln Arg Ile Gly Gly
180 185 190

Glu Leu Glu Glu Gln Ala Val Met Leu Glu Asp Phe Ser His Glu Leu
195 200 205

Glu Ser Thr Gln Ser Arg Leu Asp Asn Val Met Lys Lys Leu Ala Lys
210 215 220

Val Ser His Met Thr Ser Asp Arg Arg Gln Trp Cys Ala Ile Ala Ile
225 230 235 240

Leu Phe Ala Val Leu Leu Val Val Leu Ile Leu Phe Leu Val Leu
245 250 255

<210> 49
<211> 261
<212> PRT
<213> Homo sapiens

<400> 49

Met Ser Tyr Thr Pro Gly Val Gly Gly Asp Pro Ala Gln Leu Ala Gln
1 5 10 15

Arg Ile Ser Ser Asn Ile Gln Lys Ile Thr Gln Cys Ser Val Glu Ile
20 25 30

Gln Arg Thr Leu Asn Gln Leu Gly Thr Pro Gln Asp Ser Pro Glu Leu
35 40 45

Arg Gln Gln Leu Gln Gln Lys Gln Gln Tyr Thr Asn Gln Leu Ala Lys
50 55 60

Glu Thr Asp Lys Tyr Ile Lys Glu Phe Gly Ser Leu Pro Thr Thr Pro
65 70 75 80

Ser Glu Gln Arg Gln Arg Lys Ile Gln Lys Asp Arg Leu Val Ala Glu
85 90 95

Phe Thr Thr Ser Leu Thr Asn Phe Gln Lys Val Gln Arg Gln Ala Ala
100 105 110

Glu Arg Glu Lys Glu Phe Val Ala Arg Val Arg Ala Ser Ser Arg Val
115 120 125

Ser Gly Ser Phe Pro Glu Asp Ser Ser Lys Glu Arg Asn Leu Val Ser
130 135 140

Trp Glu Ser Gln Thr Gln Pro Gln Val Gln Val Gln Asp Glu Glu Ile
145 150 155 160

Thr Glu Asp Asp Leu Arg Leu Ile His Glu Arg Glu Ser Ser Ile Arg
165 170 175

Gln Leu Glu Ala Asp Ile Met Asp Ile Asn Glu Ile Phe Lys Asp Leu
180 185 190

Gly Met Met Ile His Glu Gln Gly Asp Val Ile Asp Ser Ile Glu Ala
195 200 205

Asn Val Glu Asn Ala Glu Val His Val Gln Gln Ala Asn Gln Gln Leu
210 215 220

Ser Arg Ala Ala Asp Tyr Gln Arg Lys Ser Arg Lys Thr Leu Cys Ile
225 230 235 240

Ile Ile Leu Ile Leu Val Ile Gly Val Ala Ile Ile Ser Leu Ile Ile
245 250 255

Trp Gly Leu Asn His
260

<210> 50
<211> 236
<212> PRT
<213> Homo sapiens

<400> 50

Met Ala Pro Asp Pro Trp Phe Ser Thr Tyr Asp Ser Thr Cys Gln Ile
1 5 10 15

Ala Gln Glu Ile Ala Glu Lys Ile Gln Gln Arg Asn Gln Tyr Glu Arg
20 25 30

Lys Gly Glu Lys Ala Pro Lys Leu Thr Val Thr Ile Arg Ala Leu Leu
35 40 45

Gln Asn Leu Lys Glu Lys Ile Ala Leu Leu Lys Asp Leu Leu Leu Arg
50 55 60

Ala Val Ser Thr His Gln Ile Thr Gln Leu Glu Gly Asp Arg Arg Gln
65 70 75 80

Asn Leu Leu Asp Asp Leu Val Thr Arg Glu Arg Leu Leu Leu Ala Ser
85 90 95

Phe Lys Asn Glu Gly Ala Glu Pro Asp Leu Ile Arg Ser Ser Leu Met
100 105 110

Ser Glu Glu Ala Lys Arg Gly Ala Pro Asn Pro Trp Leu Phe Glu Glu
115 120 125

Pro Glu Glu Thr Arg Gly Leu Gly Phe Asp Glu Ile Arg Gln Gln Gln
Page 30

130

135

140

Gln Lys Ile Ile Gln Glu Gln Asp Ala Gly Leu Asp Ala Leu Ser Ser
145 150 155 160

Ile Ile Ser Arg Gln Lys Gln Met Gly Gln Glu Ile Gly Asn Glu Leu
165 170 175

Asp Glu Gln Asn Glu Ile Ile Asp Asp Leu Ala Asn Leu Val Glu Asn
180 185 190

Thr Asp Glu Lys Leu Arg Asn Glu Thr Arg Arg Val Asn Met Val Asp
195 200 205

Arg Lys Ser Ala Ser Cys Gly Met Ile Met Val Ile Leu Leu Leu Leu
210 215 220

Val Ala Ile Val Val Val Ala Val Trp Pro Thr Asn
225 230 235

<210> 51
<211> 200
<212> PRT
<213> Homo sapiens

<400> 51

Met Ser Leu Glu Asp Pro Phe Phe Val Val Arg Gly Glu Val Gln Lys
1 5 10 15

Ala Val Asn Thr Ala Arg Gly Leu Tyr Gln Arg Trp Cys Glu Leu Leu
20 25 30

Gln Glu Ser Ala Ala Val Gly Arg Glu Glu Leu Asp Trp Thr Thr Asn
35 40 45

Glu Leu Arg Asn Gly Leu Arg Ser Ile Glu Trp Asp Leu Glu Asp Leu
50 55 60

Glu Glu Thr Ile Gly Ile Val Glu Ala Asn Pro Gly Lys Pro Ala Ala
65 70 75 80

Gln Lys Ser Pro Ser Asp Leu Leu Asp Ala Ser Ala Val Ser Ala Thr
85 90 95

Ser Arg Tyr Ile Glu Glu Gln Gln Ala Thr Gln Gln Leu Ile Met Asp
100 105 110

Glu Gln Asp Gln Gln Leu Glu Met Val Ser Gly Ser Ile Gln Val Leu
115 120 125

Lys His Met Ser Gly Arg Val Gly Glu Glu Leu Asp Glu Gln Gly Ile
130 135 140

Met Leu Asp Ala Phe Ala Gln Glu Met Asp His Thr Gln Ser Arg Met
145 150 155 160

Asp Gly Val Leu Arg Lys Leu Ala Lys Val Ser His Met Thr Ser Asp
165 170 175

Arg Arg Gln Trp Cys Ala Ile Ala Val Leu Val Gly Val Leu Leu Leu
180 185 190

Val Leu Ile Leu Leu Phe Ser Leu
195 200

<210> 52
<211> 249
<212> PRT
<213> Homo sapiens

<400> 52

Met Ser Leu Glu Asp Pro Phe Phe Val Val Arg Gly Glu Val Gln Lys
1 5 10 15

Ala Val Asn Thr Ala Arg Gly Leu Tyr Gln Arg Trp Cys Glu Leu Leu
20 25 30

Gln Glu Ser Ala Ala Val Gly Arg Glu Glu Leu Asp Trp Thr Thr Asn
35 40 45

Glu Leu Arg Asn Gly Leu Arg Ser Ile Glu Trp Asp Leu Glu Asp Leu
50 55 60

Glu Glu Thr Ile Gly Ile Val Glu Ala Asn Pro Gly Lys Phe Lys Leu
65 70 75 80

Pro Ala Gly Asp Leu Gln Glu Arg Lys Val Phe Val Glu Arg Met Arg
85 90 95

Glu Ala Val Gln Glu Met Lys Asp His Met Val Ser Pro Thr Ala Val
100 105 110

Ala Phe Leu Glu Arg Asn Asn Arg Glu Ile Leu Ala Gly Lys Pro Ala
115 120 125

Ala Gln Lys Ser Pro Ser Asp Leu Leu Asp Ala Ser Ala Val Ser Ala
130 135 140

Thr Ser Arg Tyr Ile Glu Glu Gln Gln Ala Thr Gln Gln Leu Ile Met
145 150 155 160

Asp Glu Gln Asp Gln Gln Leu Glu Met Val Ser Gly Ser Ile Gln Val
165 170 175

Leu Lys His Met Ser Gly Arg Val Gly Glu Glu Leu Asp Glu Gln Gly
180 185 190

Ile Met Leu Asp Ala Phe Ala Gln Glu Met Asp His Thr Gln Ser Arg
195 200 205

Met Asp Gly Val Leu Arg Lys Leu Ala Lys Val Ser His Met Thr Ser
210 215 220

Asp Arg Arg Gln Trp Cys Ala Ile Ala Val Leu Val Gly Val Leu Leu
225 230 235 240

Leu Val Leu Ile Leu Leu Phe Ser Leu
245

<210> 53
<211> 287
<212> PRT
<213> Homo sapiens

<400> 53

Met Lys Asp Arg Leu Ala Glu Leu Leu Asp Leu Ser Lys Gln Tyr Asp
1 5 10 15

Gln Gln Phe Pro Asp Gly Asp Asp Glu Phe Asp Ser Pro His Glu Asp
20 25 30

Ile Val Phe Glu Thr Asp His Ile Leu Glu Ser Leu Tyr Arg Asp Ile
35 40 45

Arg Asp Ile Gln Asp Glu Asn Gln Leu Leu Val Ala Asp Val Lys Arg
50 55 60

Leu Gly Lys Gln Asn Ala Arg Phe Leu Thr Ser Met Arg Arg Leu Ser
65 70 75 80

Ser Ile Lys Arg Asp Thr Asn Ser Ile Ala Lys Ala Phe Arg Ala Arg
85 90 95

Gly Glu Val Ile His Cys Lys Leu Arg Ala Met Lys Glu Leu Ser Glu
100 105 110

Ala Ala Glu Ala Gln His Gly Pro His Ser Ala Val Ala Arg Ile Ser
115 120 125

Arg Ala Gln Tyr Asn Ala Leu Thr Leu Thr Phe Gln Arg Ala Met His
130 135 140

Asp Tyr Asn Gln Ala Glu Met Lys Gln Arg Asp Asn Cys Lys Ile Arg
145 150 155 160

Ile Gln Arg Gln Leu Glu Ile Met Gly Lys Glu Val Ser Gly Asp Gln
165 170 175

Ile Glu Asp Met Phe Glu Gln Gly Lys Trp Asp Val Phe Ser Glu Asn
180 185 190

Leu Leu Ala Asp Val Lys Gly Arg Gly Pro Pro Thr Thr Arg Ser Arg
195 200 205

Ala Ala Thr Ala Asn Cys Cys Ala Trp Arg Ala Ala Ile Arg Asp Val
210 215 220

His Glu Leu Phe Leu Gln Met Ala Val Leu Val Glu Lys Gln Ala Asp
225 230 235 240

Thr Leu Asn Val Ile Glu Leu Asn Val Gln Lys Thr Val Asp Tyr Thr
245 250 255

Gly Gln Ala Lys Ala Gln Val Arg Lys Ala Val Gln Tyr Glu Glu Lys
260 265 270

Asn Pro Cys Arg Thr Leu Cys Cys Phe Cys Cys Pro Cys Leu Lys
275 280 285

<210> 54
<211> 276
<212> PRT
<213> Homo sapiens

<400> 54

Met Ser Tyr Gly Pro Leu Asp Met Tyr Arg Asn Pro Gly Pro Ser Gly
1 5 10 15

Pro Gln Leu Arg Asp Phe Ser Ser Ile Ile Gln Thr Cys Ser Gly Asn
20 25 30

Ile Gln Arg Ile Ser Gln Ala Thr Ala Gln Ile Lys Asn Leu Met Ser
35 40 45

Gln Leu Gly Thr Lys Gln Asp Ser Ser Lys Leu Gln Glu Asn Leu Gln
50 55 60

Gln Leu Gln His Ser Thr Asn Gln Leu Ala Lys Glu Thr Asn Glu Leu
65 70 75 80

Leu Lys Glu Leu Gly Ser Leu Pro Leu Pro Leu Ser Thr Ser Glu Gln
85 90 95

Arg Gln Gln Arg Leu Gln Lys Glu Arg Leu Met Asn Asp Phe Ser Ala
100 105 110

Ala Leu Asn Asn Phe Gln Ala Val Gln Arg Arg Val Ser Glu Lys Glu
115 120 125

Lys Glu Ser Ile Ala Arg Ala Arg Ala Gly Ser Arg Leu Ser Ala Glu
130 135 140

Glu Arg Gln Arg Glu Glu Gln Leu Val Ser Phe Asp Ser His Glu Glu
145 150 155 160

Trp Asn Gln Met Gln Ser Gln Glu Asp Glu Val Ala Ile Thr Glu Gln
165 170 175

Asp Leu Glu Leu Ile Lys Glu Arg Glu Thr Ala Ile Arg Gln Leu Glu
180 185 190

Ala Asp Ile Leu Asp Val Asn Gln Ile Phe Lys Asp Leu Ala Met Met
195 200 205

Ile His Asp Gln Gly Asp Leu Ile Asp Ser Ile Glu Ala Asn Val Glu
210 215 220

Ser Ser Glu Val His Val Glu Arg Ala Thr Glu Gln Leu Gln Arg Ala

225 230 235 240

Ala Tyr Tyr Gln Lys Lys Ser Arg Lys Lys Met Cys Ile Leu Val Leu
245 250 255

Val Leu Ser Val Ile Ile Leu Ile Leu Gly Leu Ile Ile Trp Leu Val
260 265 270

Tyr Lys Thr Lys
275

<210> 55
<211> 302
<212> PRT
<213> Homo sapiens

<400> 55

Met Ser Glu Asp Glu Glu Lys Val Lys Leu Arg Arg Leu Glu Pro Ala
1 5 10 15

Ile Gln Lys Phe Ile Lys Ile Val Ile Pro Thr Asn Leu Glu Arg Leu
20 25 30

Arg Lys His Gln Ile Asn Ile Glu Lys Tyr Gln Arg Cys Arg Ile Trp
35 40 45

Asp Lys Leu His Glu Glu His Ile Asn Ala Gly Arg Thr Val Gln Gln
50 55 60

Leu Arg Ser Asn Ile Arg Glu Ile Glu Lys Leu Cys Leu Lys Val Arg
65 70 75 80

Lys Asp Asp Leu Val Leu Lys Arg Met Ile Asp Pro Val Lys Glu
85 90 95

Glu Ala Ser Ala Ala Thr Ala Glu Phe Leu Gln Leu His Leu Glu Ser
100 105 110

Val Glu Glu Leu Lys Lys Gln Phe Asn Asp Glu Glu Thr Leu Leu Gln
115 120 125

Pro Pro Leu Thr Arg Ser Met Thr Val Gly Gly Ala Phe His Thr Thr
130 135 140

Glu Ala Glu Ala Ser Ser Gln Ser Leu Thr Gln Ile Tyr Ala Leu Pro
145 150 155 160

Glu Ile Pro Gln Asp Gln Asn Ala Ala Glu Ser Arg Glu Thr Leu Glu
165 170 175

Ala Asp Leu Ile Glu Leu Ser Gln Leu Val Thr Asp Phe Ser Leu Leu
180 185 190

Val Asn Ser Gln Gln Glu Lys Ile Asp Ser Ile Ala Asp His Val Asn
195 200 205

Ser Ala Ala Val Asn Val Glu Glu Gly Thr Lys Asn Leu Gly Lys Ala
210 215 220

Ala Lys Tyr Lys Leu Ala Ala Leu Pro Val Ala Gly Ala Leu Ile Gly
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Gly Met Val Gly Gly Pro Ile Gly Leu Leu Ala Cys Phe Lys Val Ala
245 250 255

Gly Ile Ala Ala Ala Leu Gly Gly Val Leu Gly Phe Thr Gly Gly
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Lys Leu Ile Gln Arg Lys Lys Gln Lys Met Met Glu Lys Leu Thr Ser
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Gln Gln Thr Gln Ala Gln Val Asp Glu Val Val Asp Ile Met Arg Val
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Asn Val Asp Lys Val Leu Glu Arg Asp Gln Lys Leu Ser Glu Leu Asp
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Asp Arg Ala Asp Ala Leu Gln Ala Gly Ala Ser Gln Phe Glu Thr Ser
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Ala Ala Lys Leu Lys Arg Lys Tyr Trp Trp Lys Asn Leu Lys Met Met
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Tyr Phe Ser Ser
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Val Asp Lys Val Leu Glu Arg Asp Gln Lys Leu Ser Glu Leu Asp Asp
35 40 45

Arg Ala Asp Ala Leu Gln Ala Gly Ala Ser Gln Phe Glu Thr Ser Ala
50 55 60

Ala Lys Leu Lys Arg Lys Tyr Trp Trp Lys Asn Cys Lys Met Trp Ala
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Ile Gly Ile Thr Val Leu Val Ile Phe Ile Ile Ile Ile Val Trp
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Val Val Ser Ser
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15

Ser Val Lys Ser Glu Arg Arg Asn Leu Leu Glu Asp Asp Ser Asp Glu
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Glu Glu Asp Phe Phe Leu Arg Gly Pro Ser Gly Pro Arg Phe Gly Pro
35 40 45

Arg Asn Asp Lys Ile Lys His Val Gln Asn Gln Val Asp Glu Val Ile
50 55 60

Asp Val Met Pro Glu Asn Ile Thr Lys Val Ile Glu Arg Gly Glu Arg
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Leu Asp Glu Leu Gln Asp Lys Ser Glu Ser Leu Ser Asp Asn Ala Thr
85 90 95

Ala Phe Ser Asn Arg Ser Lys Gln Leu Arg Arg Gln Met Trp Trp Arg
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Gly Cys Lys Ile Lys Ala Ile Met Ala Leu Val Ala Ala Ile Leu Leu
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Leu Val Ile Ile Ile Leu Ile Val Met Lys Tyr Arg Thr
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Leu Ala Lys Ile Pro Ser Glu Asn Asn Lys Leu Thr Tyr Ser His Gly
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Asn Tyr Leu Phe His Tyr Ile Cys Gln Asp Arg Ile Val Tyr Leu Cys
50 55 60

Ile Thr Asp Asp Asp Phe Glu Arg Ser Arg Ala Phe Asn Phe Leu Asn
65 70 75 80

Glu Ile Lys Lys Arg Phe Gln Thr Thr Tyr Gly Ser Arg Ala Gln Thr
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Ala Leu Pro Tyr Ala Met Asn Ser Glu Phe Ser Ser Val Leu Ala Ala
100 105 110

Gln Leu Lys His His Ser Glu Asn Lys Gly Leu Asp Lys Val Met Glu
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Thr Gln Ala Gln Val Asp Glu Leu Lys Gly Ile Met Val Arg Asn Ile
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Asp Leu Val Ala Gln Arg Gly Glu Arg Leu Glu Leu Leu Ile Asp Lys
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Thr Glu Asn Leu Val Asp Ser Ser Val Thr Phe Lys Thr Thr Ser Arg
165 170 175

Asn Leu Ala Arg Ala Met Cys Met Lys Asn Leu Lys Leu Thr Ile Ile
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Ile Ile Ile Val Ser Ile Val Phe Ile Tyr Ile Ile Val Ser Pro Leu
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Cys Gly Gly Phe Thr Trp Pro Ser Cys Val Lys Lys
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Glu Asp Leu Glu Ala Thr Ser Glu His Phe Lys Thr Thr Ser Gln Lys
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Val Ala Arg Lys Phe Trp Trp Lys Asn Val Lys Met Ile Val Leu Ile
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Gly Ala Phe Ser
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Glu Lys Lys Gln Met Val Ala Asn Val Glu Lys Gln Leu Glu Glu Ala
35 40 45

Lys Glu Leu Leu Glu Gln Met Asp Leu Glu Val Arg Glu Ile Pro Pro
50 55 60

Gln Ser Arg Gly Met Tyr Ser Asn Arg Met Arg Ser Tyr Lys Gln Glu
65 70 75 80

Met Gly Lys Leu Glu Thr Asp Phe Lys Arg Ser Arg Ile Ala Tyr Ser
85 90 95

Asp Glu Val Arg Asn Glu Leu Leu Gly Asp Asp Gly Asn Ser Ser Glu
100 105 110

Asn Gln Arg Ala His Leu Leu Asp Asn Thr Glu Arg Leu Glu Arg Ser
115 120 125

Ser Arg Arg Leu Glu Ala Gly Tyr Gln Ile Ala Val Glu Thr Glu Gln
130 135 140

Ile Gly Gln Glu Met Leu Glu Asn Leu Ser His Asp Arg Glu Lys Ile
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Gln Arg Ala Arg Glu Arg Leu Arg Glu Thr Asp Ala Asn Leu Gly Lys
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Phe His Gln Val Glu Glu Ile Arg Asn Ser Ile Asp Lys Ile Thr Gln
35 40 45

Tyr Val Glu Glu Val Lys Asn His Ser Ile Ile Leu Ser Ala Pro
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Asn Pro Glu Gly Lys Ile Lys Glu Glu Leu Glu Asp Leu Asn Lys Glu
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Ile Lys Lys Thr Ala Asn Lys Ile Arg Ala Lys Leu Lys Ala Ile Glu
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Gln Ser Phe Asp Gln Asp Glu Ser Gly Asn Arg Thr Ser Val Asp Leu
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Arg Ile Arg Arg Thr Gln His Ser Val Leu Ser Arg Lys Phe Val Glu
115 120 125

Ala Met Ala Glu Tyr Asn Glu Ala Gln Thr Leu Phe Arg Glu Arg Ser
130 135 140

Lys Gly Arg Ile Gln Arg Gln Leu Glu Ile Thr Gly Arg Thr Thr Thr
145 150 155 160

Asp Asp Glu Leu Glu Glu Met Leu Glu Ser Gly Lys Pro Ser Ile Phe
Page 42

165

170

175

Thr Ser Asp Ile Ile Ser Asp Ser Gln Ile Thr Arg Gln Ala Leu Asn
180 185 190

Glu Ile Glu Ser Arg His Lys Asp Ile Met Lys Leu Glu Thr Ser Ile
195 200 205

Arg Glu Leu His Glu Met Phe Met Asp Met Ala Met Phe Val Glu Thr
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Gln Gly Glu Met Ile Asn Asn Ile Glu Arg Asn Val Met Asn Ala Thr
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Asp Tyr Val Glu His Ala Lys Glu Glu Thr Lys Lys Ala Ile Lys Tyr
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Lys Ile Asp Ser Lys Thr Pro Glu Cys Arg Lys Phe Leu Ser Lys Leu
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Met Asp Gln Leu Glu Ala Leu Lys Gln Leu Gly Asp Asn Glu Ala
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Ile Thr Gln Glu Ile Val Gly Cys Ala Leu Glu Asn Tyr Ala Leu Lys
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Met Phe Leu Tyr Ala Asp Asn Glu Asp Arg Ala Gly Arg Phe His Lys
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Asn Met Ile Lys Ser Phe Tyr Thr Ala Ser Leu Leu Ile Asp Val Ile
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Thr Val Phe Gly Glu Leu Thr Asp Glu Asn Val Lys His Arg Lys Tyr
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Asp Ser Ser Ser Arg Pro Cys Trp Glu Leu Lys Lys Ile Met Ile Leu
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Lys Lys Met Lys Met Leu Glu Gln Pro Leu Cys Pro Leu Ser Gln Leu
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